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Data Communication CS601 Lecture No 2

Lecture Prepared By

Muhammad Abid Ali

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Forms of Information

- **Text**
- **Numbers**
- **Images**
- **Audio**
- **Video**

♦ Text: ASCII: 7-bit pattern (128 different symbols) Extended ASCII: 8-bit pattern Unicode: 32 bits pattern, which is definitely enough to represent any symbol in the world.

♦ Numbers: represented by bit pattern (binary number)

♦ Images: represented by matrix of pixels (picture element), small dot. The size of pixel represents the resolution.

♦ Audio: represent sound by continuous (analog) signal

♦ Video: can be analog or digital signal

1. Text-

In data communications, text is represented as a bit pattern, a sequence of bits (Os or Is). Different sets of bit patterns have been designed to represent text symbols. Each set is called a code, and the process of representing symbols is called coding.

2. Numbers-

Numbers are also represented by bit patterns. However, a code such as ASCII is not used to represent numbers; the number is directly converted to a binary number to simplify mathematical operations.

3. Images-

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Images are also represented by bit patterns. In its simplest form, an image is composed of a matrix of pixels (picture elements), where each pixel is a small dot. The size of the pixel depends on the resolution. For example, an image can be divided into 1000 pixels or 10,000 pixels.

4. Audio-

Audio refers to the recording or broadcasting of sound or music. Audio is by nature different from text, numbers, or images. It is continuous, not discrete. Even when we use a microphone to change voice or music to an electric signal, we create a continuous signal.

5. Video-

Video refers to the recording or broadcasting of a picture or movie. Video can either be produced as a continuous entity (e.g., by a TV camera), or it can be a combination of images, each a discrete entity, arranged to convey the idea of motion. Again, we can change video to a digital or an analog signal.

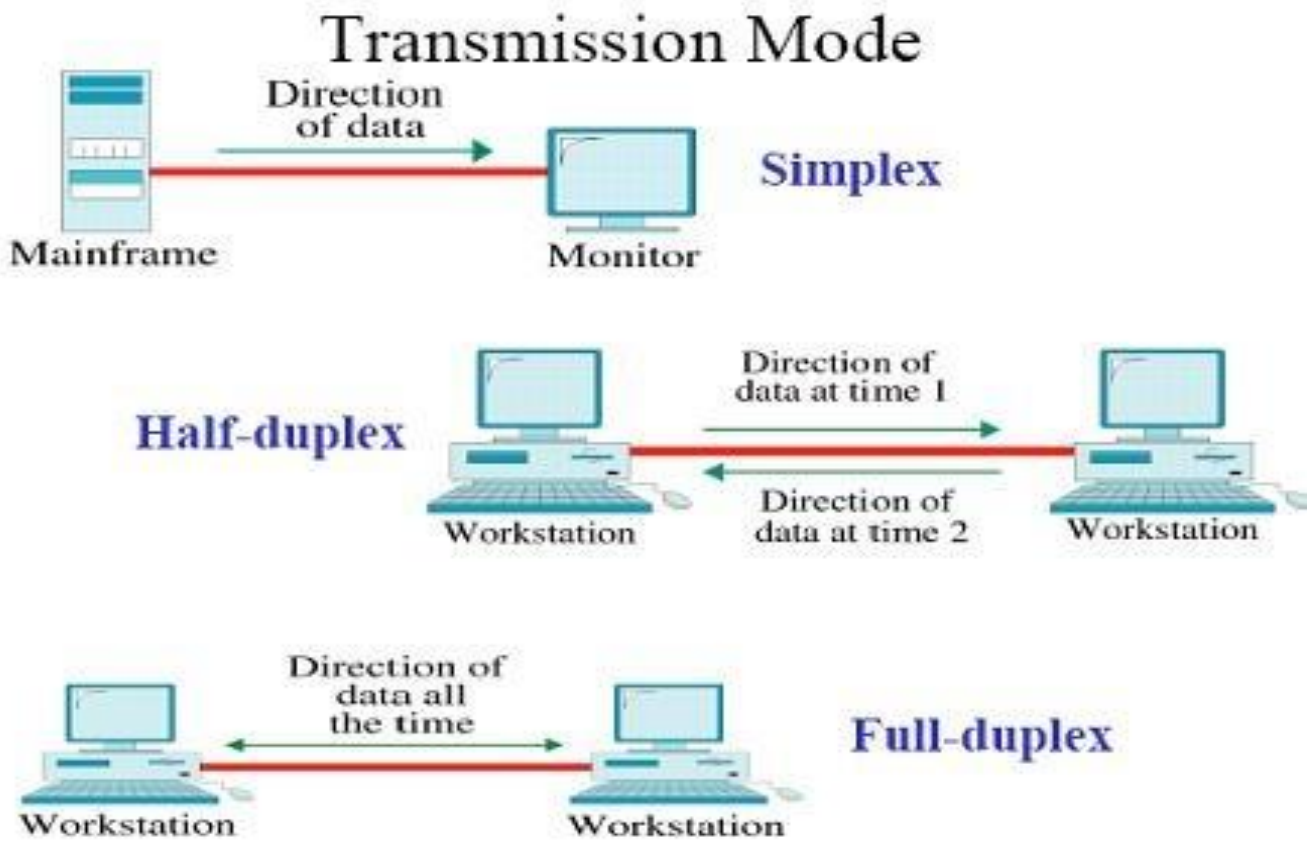
Data Flow between two devices:

- **Simplex**
- **Half-Duplex**
- **Full-Duplex**

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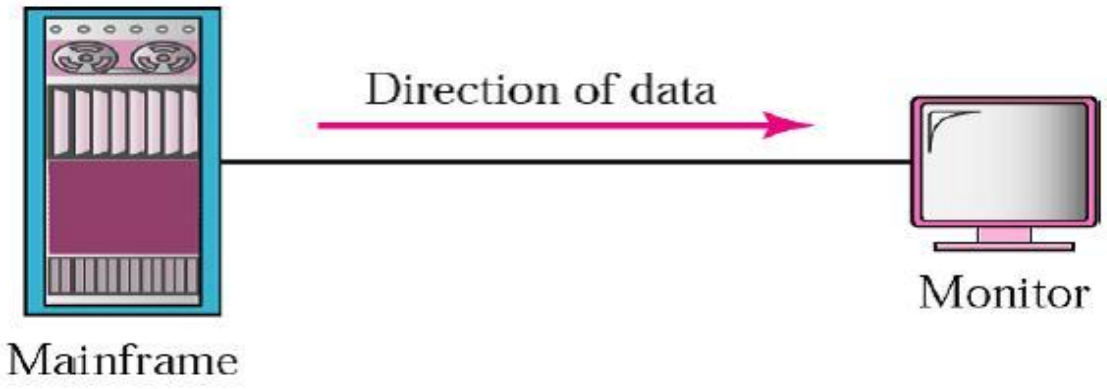
1. Simplex:

In simplex mode, the communication is unidirectional, as on a one-way street. Only one of the two devices on a link can transmit; Keyboards and traditional monitors are examples of simplex devices. the other can only receive which can be represented in the following figure.

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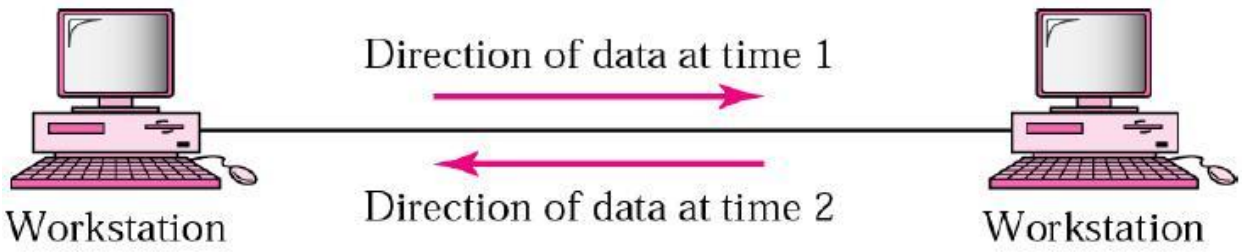
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2. Half-Duplex:

In half-duplex mode, each station can both transmit and receive, but not at the same time. When one device is sending, the other can only receive, and vice versa which will represent in the following figure.



he half-duplex mode is like a one-lane road with traffic allowed in both directions. When cars are traveling in one direction, cars going the other way must wait.

3. Full-Duplex:

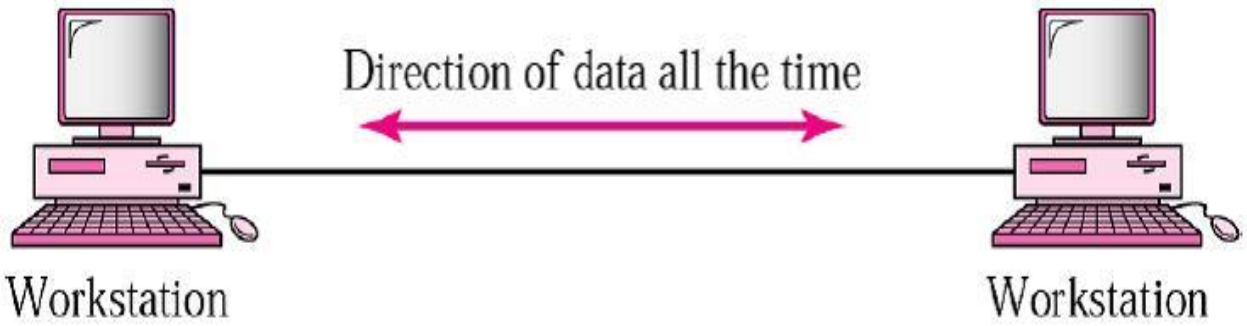
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In full-duplex mode (also called duplex), both stations can transmit and receive simultaneously as shown in the following figure.



Network:

Interconnection of a set of devices capable of communication

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A data network is **a system designed to transfer data from one network access point to one other or more network access points via data switching, transmission lines, and system controls**. Data networks consist of communication systems such as circuit switches, leased lines, and packet switching networks.

Throughput

Throughput is **the actual amount of data that is successfully sent/received over the communication link**. Throughput is presented as kbps, Mbps or Gbps, and can differ from bandwidth due to a range of technical issues, including latency, packet loss, jitter and more.

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Delay

Network delay is a design and performance characteristic of a telecommunications network. It **specifies the latency for a bit of data to travel across the network from one communication endpoint to another**.

Reliability

In computer networking, a reliable protocol is **a communication protocol that notifies the sender whether or not the delivery of data to intended recipients was successful**.

Physical Network Attributes

- **Link**
- **Type of Connection**
  - ✓ **Point-to-Point**
  - ✓ **Multipoint**



a. Point-to-point

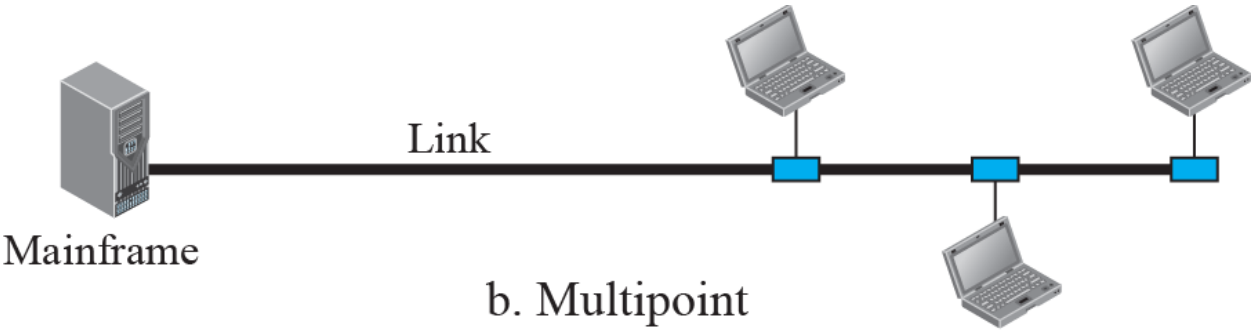
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b. Multipoint